CROP SUMMARIES AND PEST SUMMARIES — THE MATRICES

Instructions for Interpreting the Crop Matrices

Examples of the Crop Summary and Pest Summary matrices are provided below. [Apple-growing in the northeast was selected as our example.] The following is a detailed explanation of each field of the matrix (keyed with white-on-black numbers -- ❶).

OP TOLERANCE REASSESSMENT USE/USAGE MATRIX -CROP SUMMARY

❶ The ***site*** is the commodity or crop being addressed, such as apples, corn, or melons.

❷ The ***background*** on the crop summary page describes the total acres grown and other useful information, usually taken from the QUA (see Introduction). For example, the background field may describe information that might be helpful for usage assessments, such as the regional distribution of these crops.

❸ In the first column on the left is a list of the ***organophosphate pesticides*** (OP) used on that crop. EPA's data sources indicate that each of the pesticides listed is actually used on that commodity (and is not merely labeled for that use).

❹ The next two columns show the ***percent of crop treated***. These figures are based on the QUA and other sources as available. The percent of crop treated is presented as maximum and average, representing worst-case and more typical usage years.

❺ The ***number of applications a year*** - the maximum number of applications allowed per year by the label is taken from LUIS. The average, often much less than the maximum, comes from the QUAs, and from the other sources containing information directly from growers (such as the QUA+).

❻ ***Rate of application*** information is much the same - the maximum is the label rate. The more realistic use rate is represented by the average rate (from QUAs and QUA+).

❼ The ***PHI*** (pre-harvest interval) is the time between the last application of that pesticide and the harvest of the crop. The shorter the interval, the less time nature has to reduce the levels of pesticide residue on the harvested component of the crop. In this case, the **minimum** is the worst case and is derived from the product labels, QUA, and state recommendations. The average (or typical) interval is rarely reported, but in some cases it is available from the QUA+, state recommendations, arthropod management tests, or proprietary data. Additional information of this type would be very useful to the Agency.

❽ In the next table, ***Organophosphate Target Pests,*** the pests reported to be targeted are listed in order of importance. More detail about the pests is provided in the pest summary.

❾ The ***Overall Confidence Rating*** is a subjective evaluation by the analyst of the overall quality of the information available for the report. In addition, we have footnoted sources throughout.

US EPA OP Use/Usage Matrix - Crop Summary (DRAFT)

Site: Apples ❶	**Overall Confidence Rating: High** ❾

❷Background: A total of 549,370 acres are planted in apples in the United states.[9] Organophosphate pesticides (OP) represent 68% of all pesticide useage on this crop with an average of 4.62 applications per year. Analysis of OP usage was conducted for the following five major apple regions: New England (CT, MA, ME, RI, NH, NJ, NY, VT) , North Central (MI and OH), Appalachian-Southern (DE, GA, MD, NC, PA, SC, TN, VA, WV), Western (AZ and CA), and Pacific North. (OR and WA). Insecticide use patterns and key pests vary both between and within regions. In the absence of effective controls, key pests can destroy 50-90% of the crop. Due to low damage threshold levels in apples, biological control is limited to indirect pests (non-fruit feeding) with little contribution against direct pests.

Organophosphate Pesticides ❸	% Treated ❹		# Applications ❺		Rate (lb AI/A)❻		PHI (days)❼	
	Max[8]	Avg[8]	Max[6]	Avg[2, 3, 8]	Max[6]	Avg[2, 3, 8]	Min[6]	Avg
azinphos-methyl	80	73	4	2.2	3.1	0.7	7	
chlorpyrifos	63	53	NS	1.7	4	1	30	
diazinon	6	3	NS	1.6	5	1.2	21	
dimethoate	35	27	NS	1	2.0	0.9	28	
malathion	13	9	NS	2.1	2.3	0.7	21	
methyl parathion	26	19	NS		2	1.7	21	
phosmet	34	22	NS	2.9	4	1.1	7	

Confidence Rating: H= high confidence = data from several confirming sources; confirmed by personal experience
M = medium confidence = data from only a few sources; may be some conflicting or unconfirmed info.
L = low confidence = data from only one unconfirmed source

Organophosphate Target Pests for Apple in New England Region (Primary pests controlled by the OP's)[1-5, 7] ❽	
Major	Bug (Tarnished Plant), Aphids (Rosy Apple, Apple, and Spirea), Apple Maggot, Plum Curculio
Moderate	Leafroller (Oblique banded and Red banded)
Minor	Fruitworm (Green and Sparganothis), Sawfly (European Apple), Leafhopper (White Apple and Potato), Scale (San Jose), Mite (European Red), Leafminer (Spotted Tentiform)

Major = 20+% of all OP usage on pest; Moderate = 5-20% of all OP usage on pest; Minor =<5% of all OP usage on pest

Sources:

1. Proprietary EPA market share information.
2. U.S. Apple QUA+ - New England. 1997.
3. QUA+ - New England Fruit Consultants.
4. Pest Management Recommendations for Commercial Tree Fruit Production. 1997. Cornell University.
5. 1996-1997 New England Apple Pest Management Guide. Cooperative Extension (Universities. of Connecticut, New Hampshire, Maine, Rhode Island, Massachusetts and Vermont)
6. Label Use Information System (LUIS) Version 5.0, EPA.
7. The All-Crop, Quick Reference Insect Control Guide (1997), Meister Publishing Company
8. EPA QUA.
9. Agricultural Statistics 1998. National Agricultural Statistics Service. United States Department of Agriculture.

OP TOLERANCE REASSESSMENT USE/USAGE MATRIX -- PEST SUMMARY

❶ The ***site*** is the commodity or crop being addressed, such as apples, corn, or melons.

❷ The pest summaries are created for distinct ***regions*** when appropriate. In some cases, regional differences for crop growing practices are slight, and the data are then provided for the national level. Where appropriate, information is broken down by crop, then divided further into fresh market and processed.

❸ Because the ***timing*** of application affects residues and thus is an important factor for tolerance reassessment, the analysts further subdivided the information at this level according to the timing of the application (for example, dormant, pre-bloom, at-plant, foliar). This information is available primarily from EPA's proprietary data bases and the State Recommendations.

❹ The ***pest*** and its importance are derived from proprietary data bases and the State Recommendations. Information about pests is key in evaluating the relative importance of each OP. Pest importance is determined by comparing the total amount of OP pesticides used to control **that pest** to the total amount OP pesticides used to control **all pests**. Relative pest importance is represented as follows:

major pest:	more than 20% of all OP usage is to control this pest
moderate pest:	5 to 20% of all OP usage is to control this pest
minor pest:	1 to 5% of all OP usage is to control this pest

❺ The next column lists the ***organophosphate chemicals*** (OP's) most used to control the pest. This information is obtained from several sources: QUAs, LUIS, , NASS data, State Recommendations, OPP's Reference File System (REFs), and the 40 CFR tolerances.

❻ If information is available to us (and it is most often not), the ***efficacy*** of that chemical against that pest is characterized next, based on State Recommendations for fruits, previous EPA analyses, NAPIAP reports, or efficacy reports submitted under FIFRA Section 18 Emergency Exemptions. It is important to note that the Agency is not analyzing the available efficacy information, but is relying on these sources to characterize efficacy. Efficacy is represented according to the following symbols:

=	excellent
=	good
=	fair

❼ For each chemical used to control a given pest, the ***market share*** (when available) is indicated, based on proprietary sources, State Recommendations, NAPIAP reports, or previous EPA benefits assessments. This, unlike the pest importance, is a comparison of each individual chemical's usage (to control that pest) with **all** insecticide usage to control that pest. Market Share is represented as follows:

Usage of this chemical represents:

high:	more than 20% of all insecticide usage on this crop for the control of this pest
medium:	5 to 20% of all insecticide usage on this crop for the control of this pest

low: 1 to 5% of all insecticide usage on this crop for the control of this pest

Looking across the page, the next block of information refers to alternatives to the OP's [Since OP's can be alternatives for each other, this block is intended to capture only non-OP alternatives.] Despite the fact that a non-OP alternative appears on the same line as an individual OP, there is **no** correlation between the alternative and any individual OP. The non-OP is simply one alternative to combat the pest in question in that crop.

❽ The alternative pesticides are characterized by their ***class*** (carbamate, pyrethroid, chlorinated hydrocarbon, insect growth regulator, biological, or other).

❾ The ***alternative pesticide list*** is based on QUA+ information, State Recommendations, and proprietary data bases. The Agency has also received information from various sources, such as grower organizations, USDA, and EPA documents, about alternatives in development. Where appropriate, those have been included. Although these pesticides are not yet available for this use, they are important in consideration of regulatory options and transition.

The ***Constraints of alternatives*** field on the far right of the table provides a place to identify any problems or inadequacies of the alternative insecticides . This information is obtained from QUA+, stakeholder groups, and State Recommendations. This can be important in understanding the effects of the alternatives; for example, pyrethroids are often hard on mite predators, which may result in a flush of secondary mite infestations. The comments are intended to give the reader some feel for the issues associated with non-OP alternatives.

US EPA OP Use/Usage Matrix: Pest Summary (DRAFT)

Site: Apple ❶

Region: New England (Including: CT, MA, ME, RI, NH, NJ, NY, VT) ❷

Pest[2, 3, 4, 5, 8]	Organophosphate[1, 2, 3, 4, 5, 8]	Efficacy[4, 5]	Mkt[1]	Class	Alt. Pesticide List[1, 2, 3, 4, 5, 8]	Efficacy[4, 5]	Mkt[1]	Constraints of Alternatives[2, 3, 8]
❸ **Timing: Post-Bloom**								
❹ Apple Maggot (Major)	azinphos-methyl ❺	❻	High ❼	C ❽	carbaryl ❾	❻	Lo ❼	**Pyrethroids** are disruptive to IPM practices and would result in mite explosions and resistant pest populations. **Carbamates** are also disruptive to established IPM programs. In addition, both carbaryl and methomyl have low residual activity against adults and would require 1-2 more applications than OP's.
	chlorpyrifos		Lo	C	methomyl		Lo	
	diazinon		Lo	P	esfenvalerate		Lo	
	dimethoate		Lo	P	permethrin	---	Lo	
	malathion		Lo					
	parathion		Lo					
	phosmet		High					

ADDITIONAL INFORMATION

Apple production in the New England Region (Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island, and Vermont) accounts for 17.9% of total acreage and 12.7 % of production for the US. OP usage represents 68.8% of all pesticide usage during the Pre-Bloom period in the New England Region. New England fruit growers have since the 1970's readily adopted Integrated Pest Management practices. Many growers have moved beyond the first stages of IPM to a more bio-intensive level, using more cultural and biological practices to limit insect and disease damage. Plum Curculio is the most significant fruit insect pest in New England and the most difficult to control. No material other than OP's provide acceptable commercial control. Despite intensive study at UMASS (Amherst) for the past 20 years, no IPM strategies have been identified which are effective against Plum Curculio. Without an effective alternative control agent for Plum Curculio, commercial apple production in the Northeast would be impossible within 3-5 years. There are many other insecticides which can control Plum Curculio but over the years have demonstrated a negative long lasting impact on the predators and beneficial organisms which control later season apple pests. Using these insecticides, particularly Pyrethroids, would guarantee more late season chemical sprays to control insects that in most orchards have been controlled for years biologically.

SOURCES:

1. Proprietary EPA market share information.
2. U.S. Apple QUA+ - New England. 1997.
3. New England Fruit Consultants.
4. Pest Management Recommendations for Commercial Tree Fruit Production. 1997. Cornell University.
5. 1996-1997 New England Apple Pest Management Guide. Cooperative Extension (Univ. of Connecticut, New Hampshire, Maine, Rhode Island, Massachusetts and Vermont)
6. The All-Crop, Quick Reference Insect Control Guide (1997), Meister Publishing Company.
7. Label Use Information System (LUIS) Version 5.0, EPA.
8. Communications with New England Extension Personnel and Apple Producers.